PLEISTOCENE PECCARIES FROM THE CUMBERLAND CAVE DEPOSIT.

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Remains of extinct peccaries are among the most abundant fossils found in the Cumberland Cave deposit, discovered a few years ago in the vicinity of Cumberland, Maryland.[1]

Two genera are recognized—*Platygonus* and *Mylohyus*—the former being represented by young and adult specimens of both sexes, pertaining to more than 30 individuals, which include one nearly complete skeleton and 15 more or less complete skulls. Compared with this abundant and good material *Mylohyus* is poorly represented. But the few specimens obtained of the latter, although fragmentary, also add something to our knowledge of this genus.

This material from the Cumberland Cave not only adds some new species to the list, but forms the basis of the following observations and definitions relative to the classification and relationships of the peccaries in general, which definitions have for their special object a clearer understanding of the Pleistocene species with which the present paper is more intimately concerned:

The first notice of fossil remains of Pleistocene peccaries was published in 1848[2] by John L. LeConte, who described under the name *Platygonus compressus* a few fragments of a skull and other bones found in a fissure deposit in the vicinity of Galena, Illinois. Since that time a considerable number of specimens, representing various species, have been described by other authors. Some of these descriptions and determinations were based on fragmentary material, others on material which included nearly complete skulls and skeletons. Yet always there seems to have been considerable confusion, only partially cleared up by the more recent writers, regarding the proper generic and specific distinctions, and even family

[1] A preliminary report of the occurrence and character of this deposit, together with an uncompleted list of the species represented, was published in August, 1913. Gidley, Proc. U. S. Nat. Mus., vol. 46 (1914), No. 2014, pp. 95, 96. This report has been supplemented by a semipopular account published in the Report of Smithsonian Institution for 1918, now in press.

[2] Amer. Journ. Sci., ser. 2, vol. 5, 1848, pp. 102–106; Mem. Amer. Acad. Arts Sci., vol. 3, 1848, pp. 257–274.

characterizations of this group have not been well defined. Thus vertebrate paleontologists have usually recognized only one living genus of peccaries, "*Dicotyles*" (=*Tayassu*), and to this group the earlier writers referred most of the fossil forms discovered, although it is now known that most, if not all, these species belong to extinct genera. There has likewise been a decided tendency among paleontologists to consider the peccary group as a whole as of only subfamily rank, although some later writers have followed the mammalogists in classifying the suillines under two distinct families, the Suidae and Tayassuidae, but they have done this without giving any particular reasons for this change of opinion; in fact there seems to have been considerable reluctance on the part of paleontologists in following the mammalogists both in their recognition of two distinct genera of living peccaries, and in admitting full family distictions between the peccaries and true pigs. A study of the literature suggests this attitude has been due, in part at least, to the lack in definitions given for living forms of characters based on osteological features. And added to this the idea seems to prevail among paleontologists that the known extinct forms, especially of the older formations, rather definitely unite the two suilline groups in a single family.

In this connection it may be stated that Matthew and Gidley[1] several years ago pointed out that the known peccaries, both living and extinct, are confined in their distribution entirely to the New World, while the true pigs seem as exclusively to belong to the Old World, and they expressed the opinon at that time that these two groups comprise subfamilies derived from "the primitive Suidae, common to both hemispheres in the Oligocene." Matthew later[2] somewhat modified this arrangement in giving full-family rank to the pig and peccary groups, and suggested their derivation, together with the Elotheriidae, "from a common Eocene ancestry." My present view fully accords with this later conclusion except that, from certain modifications observed in the earliest known forms, I believe the elotheres must have split off from the primitive ancestral group at a very much earlier date than that which marked the definite separation of the Suidae and Tayassuidae.

From the foregoing it seems evident that the definitions of the two families of suillines, and especially the two genera of living peccaries (one of which is not even now recognized by paleontologists), are in this connection in need of revision since these definitions have a special bearing on any attempt to clear up and make determinable the Pleistocene species of peccaries. I therefore deem them necessary to an intelligent description of any new material.

[1] Bull. Amer. Mus. Nat. Hist., vol. 20, 1904, p. 267.
[2] Idem., vol. 23, 1907, p. 216.

Hay seems to have realized this need in his brief study of the peccaries as indicated in his treatise on The Pleistocene Mammals of Iowa.[1] But he here redefined only, the family Tayassuidae and but one living genus, *Tayassu* (not recognizing the other), together with the two Pleistocene genera, *Platygonus* and *Mylohyus*. Moreover, Hay's definitions are based principally on characters of the dentition and are not adequate except for the purpose for which they evidently were intended, namely, of distinguishing the Pleistocene genera from the living peccaries and from each other. The following definitions are, therefore, here proposed:

Family SUIDAE.

1, Paired-toed ungulates, with diminishing lateral digits, but with median digits never coalesced, and with skull modified along the lines of a short cranium with high supraorbital region and more or less elongated facial region (in living forms, snout abruptly truncated, terminating in a vertically flattened and expanded pad.) 2, Dental series usually complete, and never with long diastema behind the canines, cheek-teeth brachyodont-bunodont in type; the premolars usually unreduced in numbers (in *Babirusa* and *Potamochoerus* reduced to $\frac{2}{2}$), always more simple than the molars, and not tending to become molariform; molars primarily four cusped, subquadrate, relatively large, the last of the series in the more recent forms tending to become greatly enlarged and lengthened by posterior addition of cusps, and accompanied with complexity of tubercles and enamel foldings; incisors usually $\frac{3}{3}$ (sometimes $\frac{2}{3}$ or $\frac{1}{3}$); premaxillae narrow, with alveolar border greatly lengthened, incisors, except in the more primitive forms, increasing in size from behind forward; lower incisors more or less procumbent in the later forms, the much elongated median two pairs converge forward so that the tips of both pairs come in full contact with the hinder surface of a single enlarged median pair above; canines (especially in the males) usually developed into large curved and formidable tusks, the upper pair directed outward and tending to recurve upward (extremely upturned in *Babirusa*), the lower pair irregularly triangular in cross section; 3, lachrymal large, extending well onto the face, widely separating the jugal from contact with the frontal; 4, zygomatic ridge of the maxillary separated from the side of the face by a wide rostral sulcus,[2] which extends backward above it nearly to the anterior border of the orbit; 5, basicranial plane nearly parallel with the plane of the palate (except in *potamochoerus;*) 6, glenoid fossae elevated above the basicranial plane, and lying near the external auditory meatus; 7, paroccipital processes usually produced

[1] Ann. Rept. Iowa Geol. Surv. for 1912, vol. 23, 1914, pp. 212–228.

[2] This sulcus carries the strongly developed snout muscles.

into long, peg-like protuberances which are directed downward and slightly forward, paralleling and usually closely appressed to the greatly elongated otic bullae; 8, external portion of the mastoid, in the later forms at least, modified into an elongated tube surrounding the external auditory meatus, but otherwise not much expanded; 9, in the living forms the stomach is simple, except for a more or less developed pouch near its cardiac orifice, and usually more than two young are produced at each birth.

Family TAYASSUIDAE.

1, Superficial modifications of feet and skull much as in the Suidae, but with a generally more advanced reduction of the lateral digits, and usually, except in the more primitive forms, with metatarsals III and IV coalesced to form a cannon bone; 2, dental series in general as in Suidae, but with the following constant differences: Premolars except in most primitive forms reduced to $\frac{3}{3}$, with tendency to great lengthening of diastema behind the canine; premolars tending to become molariform; molars subequal, not greatly exceeding the posterior premolars in size, more simple than is usual in the Suidae; incisors usually reduced or tending to reduce to two above and below; canines formidable tusks in both males and females, the upper ones being directed downward and slightly outward with no tendency to recurve upward. These are, moreover, usually lanceolate in cross section when unworn, early becoming triangular as the anterior face is worn away by contact with the lower tusk closing in front of it; 3, in the more recent forms, at least, lachrymal small, confined to the anterior margin of the orbit, allowing a wide contact of the jugal with the frontal; lachrymal foramina reduced or absent; 4, zygomatic ridge of the maxillary extending obliquely forward and upward to the side of the face, limiting the backward extension of the rostral sulcus to the region of the infraorbital foramen; 5, basicranial plane bent upward anteriorly, at a very considerable angle to the plane of the palate; 6, glenoid fossae extending downward and forward well below the basicranial plane, and well separated from the external auditory meatus by a broad bony expanse of the mastoid; 7, paroccipital processes, so far as known, relatively short, and directed downward and backward nearly at right angles to the long axis of the bullae; 8, mastoid region expanded into a broad thin plate which overlaps and early fuses with postglenoid squamosal portion of the zygoma, more or less completely obscuring the external form of the elongated tube of the external auditory meatus; 9, in the living forms the stomach is complex, and there are normally no more than two young produced at each birth.

Regarding the validity of the two living genera of peccaries, the following comparative lists of characters seem to distinguish them:

Tayassu Fischer.	*Pecari* Reichenbach.
1. Lower anterior portion of face broader than middle anterior portion, a feature produced by a sharply defined overhanging ledge formed by the lateral swelling out of a ridge of the maxillary, commencing on the inner side of the infraorbital foramen and extending forward to the alveolus of the canines.	1. Lower anterior portion of face narrower than middle anterior portion. No lateral swelling of the maxillary in this region.
2. Upper posterior portion of face relatively broad and moderately curved laterally.	2. Upper portion of face relatively narrow and strongly arched laterally.
3. Outer surface of the jugal below orbit moderately expanded and nearly flat; its inferior external border forming an acute ridge which is continuous but not in a direct line with that of the maxillary which it meets at a distinct angle, the latter continuing forward and upward disappears above and considerably behind the canine.	3. Outer surface of the jugal below orbit relatively shallow, its anterior portion depressed to form a shallow pit, or depression at the anterior inferior border of the orbit; inferior external ridge of jugal continuous in a direct line with that of the maxillary; the latter extending forward and but slightly upward, disappears in a small lateral prominence directly above the canine.
4. Orbito-frontal foramina opening superiorly, relatively close together, directly above the anterior border of the orbit, the deep sulci leading forward away from them in distinctly diverging lines. Anteriorly they slope gently downward on the sides of the face and disappear near the anterior extremity of the maxillary ridge.	4. Orbito-frontal foramina opening superiorly, relatively well apart and farther back than in *Tayassu*, the sulci leading from them first converging forward for about one-half their length, then diverging they pass forward and finally recurve abruptly downward to the border of the maxillary ridge. From the extreme anterior points of these curves a second pair of sulci continue forward along the sides of the face to the upper border of the nasal notch.
5. Space between incisive border and canine not laterally constricted; the extreme anterior border of the maxillary swelling outward at the forward border of the canine forms a shallow depression for the reception of the point of the moderately long lower canines.	5. Space between incisive border and canine latterally constricted; the extreme anterior border of the maxillarly modified to form an angular buttress, past which the posteriorly truncated points of the longer lower canines bite.
6. Cheek-teeth with relatively low, broadly cone-shaped main cusps, and prominent intermediary cusps; the last premolars above and below almost completely molariform and p^3 above submolariform. Canines relatively short, the upper ones thin and much extended anteroposteriorly with their	6. Cheek-teeth in unworn condition with relatively high and pointed main cusps; intermediary cusps usually incipient, tending to form lophs; last premolars above and below submolariform all premolars tending toward the molariform pattern, but all are more simple than in *Tayassu;* canines

posterior borders directed outward to a degree that were the planes of their long axis extended they would converge to meet within the incisive border; lower canines strongly curved and widely divergent.	relatively long and thick, the upper ones with their long axes nearly parallel; lower canines less curved and less divergent than in *Tayassu*.
7. Diastemata behind canines about equaling length of premolar series.	7. Diastemata behind canines considerably less than length of premolar series.

These definitions seem to clear up to some extent our understanding of the living peccaries, especially in their bearing on the Pleistocene genera, and suggest the following modifications and additions to the definitions proposed by Hay,[1] for *Platygonus* and *Mylohyus*.

Genus PLATYGONUS LeConte.

Peccaries with snout moderately lengthened; functional digits two (III and IV) on each foot, other digits, if present, represented only by simple splints or nodules of bone; outer lower incisors much reduced, frequently wanting; all premolars above and below more simple than the molars, each consisting of a single conspicuous pair of moderately elevated, transversely placed cusps and usually with heavy basal cingulum, the lower premolars having in addition a transverse row of low but well-developed heel cusps, tending strongly toward the condition found in *Pecari*, but less advanced in this respect; molars similar to but more progressive than those of *Pecari*, being composed of two pairs of moderately elevated, transversely placed cusps, which form continuous transverse ridges even in teeth which are but slightly worn; modifications of the upper and anterior portions of the face, and relative positions of the supra-orbital foramina and the suprafacial sulci more nearly like the modifications found in *Pecari* than in *Tayassu;* space between the incisive border and the canines laterally constricted, and the maxillary buttress above the canines formed much as in *Pecari* but more stronly developed than in the living genus.

Genus MYLOHYUS Cope.

Peccaries with long slender snouts; digits reduced to single pairs in the hind feet only, the fore feet retain a second, small but almost functionless pair of lateral digits; outer pairs of incisors, above and below, wanting; last two pairs of premolars, above and below, subequally four cusped, completely molariform, the others submolariform, all with no basal cingulum; molars with four principal little elevated, subsequal cusps, tending to pair transversely about as in

[1] See pp. 217 and 225 respectively of his treatise on The Pleistocene Mammals of Iowa, already cited.

Tayassu;[1] space between the incisive border and the canines not laterally constricted, maxillary buttress for reception of the relatively less heightened lower canine much as in *Tayassu;* characters of upper facial region and posterior portions of the skull unknown.

The foregoing is not intended as a final revision even of the Pleistocene and living peccaries, much less of the entire group and the following is by no means a serious attempt at straightening out all the limitations of Pleistocene species which still seem somewhat confused.[2]

Genus PLATYGONUS LeConte.

Type species.—Platygonus compressus LeConte. (For definition of genus see p. 656.)

Hay has followed Leidy in considering *P. alemani* Dugès as synonomous with *P. vetus* Leidy, and has combined *P. compressus* Leidy with *P. leptorhinus* Williston; yet comparisons of figures and descriptions together with the material at hand, which includes part of the type of *P. alemani*, indicate differences which to me seem sufficient to retain all four species as valid. They may be therefore briefly characterized as follows:

PLATYGONUS COMPRESSUS LeConte.

Synonym. (*?*)—*Euchoerus macropus* Leidy.

Type.—Fragments of a skull and jaws and a few pieces of other bones. Locality: near Galena, Illinois. Described by Dr. John L. LeConte in 1848.[3]

Diagnosis.—A species of moderate size; total length of cheek tooth series, 74 to 80 mm.; diastema behind canine (upper jaw) about one and one-half times the length of the premolar series; m^2 distinctly longer than wide except when greatly worn by use.

The type specimen is too fragmentary to show other features. If, however, the specimens from near Rochester, New York, described under this species by Leidy,[4] have been correctly referred, the following distinctive characters may be added: Inion relatively low, with sagital crest well arched; temporal fossae short, anteroposterior diameter being about twice that of the orbit; vertical expansion of jugal less than diameter of the orbit.

[1] *Mylohyus* resembles *Tayassu* in much the same way as *Platygonus* resembles *Pecari*, but in *Mylohyus* the premolars and milk teeth are more progressive than those of either of the living genera.

[2] A complete revision of the peccaries in general, including those of the Pleistocene, is a work much needed, but this can not satisfactorily be done except by a critical restudy of actual types and all other available material. Such a critical restudy by the present writer is at present not practical as many of the types and other important specimens are in other Museums, and figures and descriptions may not be relied upon in a work of such extensive proportion as would be thus involved.

[3] Amer. Journ. Sci., vol. 5, 1848, p. 103, figs. 1 and 2.

[4] Leidy, Trans. Wagner Free Inst., 1889, pp. 41-50.

PLATYGONUS VETUS Leidy.

Type.—Portion of a palate containing most of the cheek-teeth and a fragment of a lower jaw containing the last true molar. Present location of type, Academy of Sciences, Philadelphia.

Type locality.—Mifflin County, Pennsylvania. Described by Leidy in 1889.[1]

Diagnosis.—A decidedly larger species than *P. compressus;* total length of cheek-tooth series about 97 mm.; upper molars 1 and 2 nearly as wide as long; apparently no intermediary cusps or loph connecting anterior and posterior lobes of the molars. Other specific characters not known. I provisionally refer to this species a single specimen (Cat. No. 8917, U. S. N. M.), consisting of a portion of the palate of a young individual, lacking the two last molars and carrying the last two milk-molars of the right side. The teeth are about the same size, the molars have the same proportion, and they appear to agree in other respects with those of Leidy's type.

Measurements of specimen No. 8917, referred to P. vetus.

Length of premolar series		40 mm.
Diameters in millimeters—	Antero-posterior	Transverse.
p^2	12	12
p^3	12	13
p^4	12.5	14+
dp^3	12.5	11.5
dp^4	13	12.5
m^1	16.5	16.3
m^2	20.5	20
Length of premolar series	40	mm.
Length of cheek-tooth series, exclusive of m^3	76	mm.
Width of palate between second molars	22.5	mm.

PLATYGONUS ALEMANI Dugès.

Type.—Portions of a skeleton, including a palate fragment carrying all the cheek-teeth; lower jaws (lacking only a portion of one angle; the incisive border, the crowns of the canines, broken off, and one premolar); the right hind foot (lacking only two phalanges); and portions of a scapula, humerus, ulna, five cervical vertebrae and a rib. This type, lacking the palate and scapula portions, is in the U. S. National Museum (Cat. No. 791).

Type locality.—Near Moroleon, Guanajuato, Mexico; about 200 miles northwest of the City of Mexico. Described by Dr. Alfredo Dugès, in 1887.[2]

Diagnosis.—A somewhat smaller species than *P. vetus;* total length of upper cheek-tooth series (estimated) about 87 mm.[3] It

[1] Leidy, Proc. Acad. Nat. Sci. Phila., 1883, p. 301; Ann. Rept. Penn. Geol. Surv. for 1887, 1889, pp. 12–14, pl. 2, figs. 1 and 2.

[2] La Naturaleza, ser. 2, vol. 1, 1887 to 1890. Note, Dugès' article is dated "Dec., 1883," but it seems not to have been published until 1887.

[3] This estimate is based on the actual length of the lower series which measures 90 mm. In *Platygonus* the lower series exceeds the upper in length from 3 to 5 mm.

further differs from *P. vetus* in the shorter snout, as indicated by the relatively shorter symphysis of the lower jaw; and by the apparently much greater relative width of the palate. This last character is suggested in Dugès's figure, and is borne out by the relatively wide distance between the dental series of the lower jaw of the type specimen.

PLATYGONUS LEPTORHINUS Williston.

Type.—Williston did not designate a type specimen for this species, hence the nearly complete skeleton of an adult female first mentioned and figured by him may be selected. Location of type (?) Kansas University Museum.

Type locality.—Goodland, near Fort Wallace, western Kansas. Described by Williston in 1894.[1]

Diagnosis.—About the size of *P. compressus;* length of cheek-tooth series 75 to 80 mm. (see Williston); proportions and general appearance of teeth about as in that species. It differs from *P. compressus* in having a deeper and shorter jaw angle; in the relatively less antero-posterior expansion of the coronoid process; the more procumbent position of the lower incisors giving a decided angulation to the chin, and in the relatively greater vertical expansion of the zygomatic processes. In *P. leptorhinus* this expansion in the female skull figured is slightly less than the vertical diameter of the orbit. In the male it is nearly one and one-half times the vertical diameter of the orbit.

PLATYGONUS CUMBERLANDENSIS, new species.

Type.—A nearly complete male skull associated with a portion of the lower jaw[2] (Cat. No. 8146, U.S.N.M. Coll.). Paratype: a nearly complete skeleton of an adult female (Cat. No. 8200. U.S.N.M. Coll.).

Type locality.—Cave deposit about 4 miles northwest of Cumberland, Maryland. Collected by Gidley, June, 1914.

Diagnosis.—A large species, nearly equalling *P. vetus* in size. Length of cheek-tooth series, type (male), 94 mm.; paratype (female), 87 mm. Differs also from *P. vetus* in having a greater relative length of the molars in animals of corresponding age, and in the possession in the upper molars of well-developed intermediary cusps and lophs, which connect at their bases the two principal cross lophs, as in *P. compressus* and *P. leptorhinus.* It differs from both these last named species in the much larger size of the skull, in which there is a relatively higher and more backwardly produced inion and a more strongly developed expansion of the zygoma,

[1] Kansas Univ. Quart., vol. 3, 1895, No. 1, July, 1894, pp. 23 to 40 with plates 1 and 8 and seven text figures.

[2] This association is not certain but highly probable, as the jaw portion was found near the skull, and a careful examination of the teeth in the two specimens shows almost exactly the same degree of wear.

the latter being about one and one-third times the vertical diameter of the orbit in the females, and two or more times this diameter in the males.

PLATYGONUS INTERMEDIUS, new species.

Type.—The greater portion of a male skull lacking the condyles and the basicranial region (Cat. No. 8148, U.S.N.M. Coll.). *Paratype*, a nearly complete skull of a female. Cat. No. 8147, U.S.N.M. Coll.

Type locality.—Cumberland Cave.

Diagnosis.—General characteristics much as in *P. cumberlandensis*, but differing from that species as follows: Skull smaller; dentition and especially the canines relatively larger (see table of comparative measurements p. 668); diastema behind canines relatively shorter. A species with teeth relatively large for size of skull.

Measurements in millimeters of skeleton No. 8200.

Total length of vertebral column, atlas to distal end of sacrum	920
Length of cervical series	220
Length of dorsal series	420
Length of lumbar series	130
Length of sacrum	150
Greatest width of atlas	108
Width of condylar facets of atlas	60
Width of axis facets of atlas	53
Length of axis, exclusive of odontoid process	44
Height of spine of axis	30
Height of spine of first dorsal	140
Height of spine of fourth dorsal	120
Height of spine of eighth dorsal	70
Height of spine of second lumbar	30
Height of spine of last lumbar	25
Length of tail (9 vertebrae)	135
Fore limbs and feet:	
Length of scapula	220
Greatest width of blade of scapula	110
Greatest width of articular face	33
Height of spine of scapula	35
Length of humerus	220
Width of proximal articular face	40
Width of distal articular face	34
Anteroposterior diameter of shaft just below deltoid tubercle	39
Greatest length of ulna	240
Greatest length of radius	170
Transverse diameter of sigmoid fossa	35
Transverse diameter of distal face of radius	41
Least width of conjoined bones	33
Transverse diameter of carpus	37
Length of carpus, inside	28
Length of carpus, outside	35
Width of metacarpals III and IV, proximal end	37
Length of metacarpal III, inner side	91
Least transverse width of these two metacarpals	37
Length of the three phalanges of digit III	95

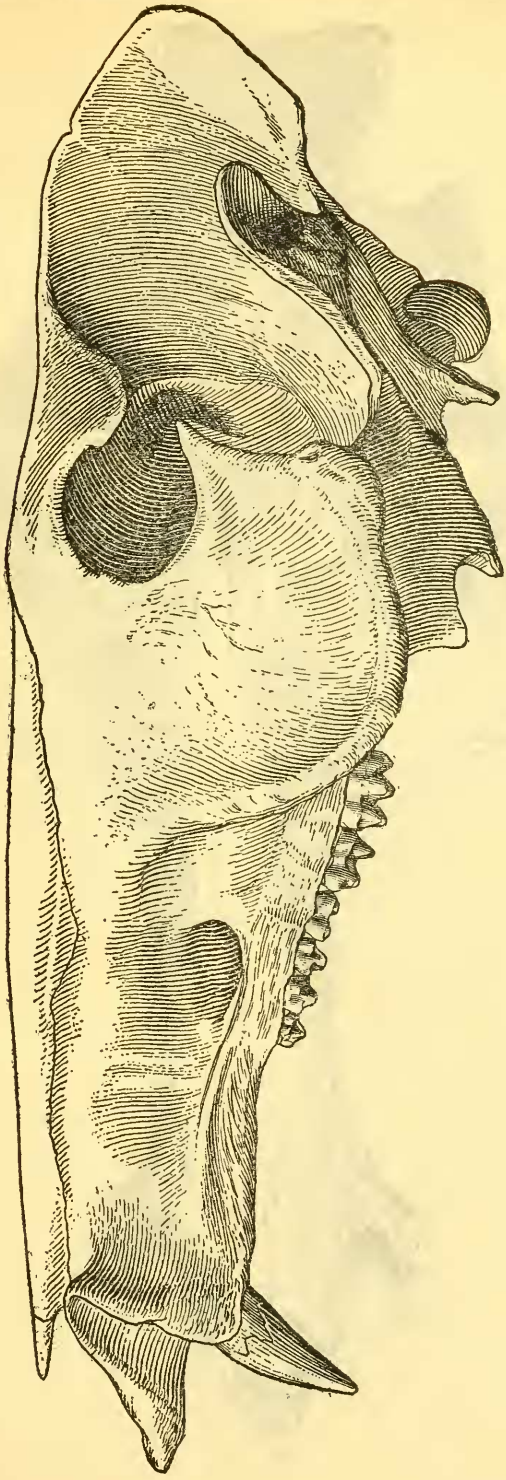

FIG. 1.—PLATYGONUS CUMBERLANDENSIS. SKULL, VIEW OF LEFT SIDE. × ½. TYPE SPECIMEN, CAT. NO. 8146, U.S.N.M

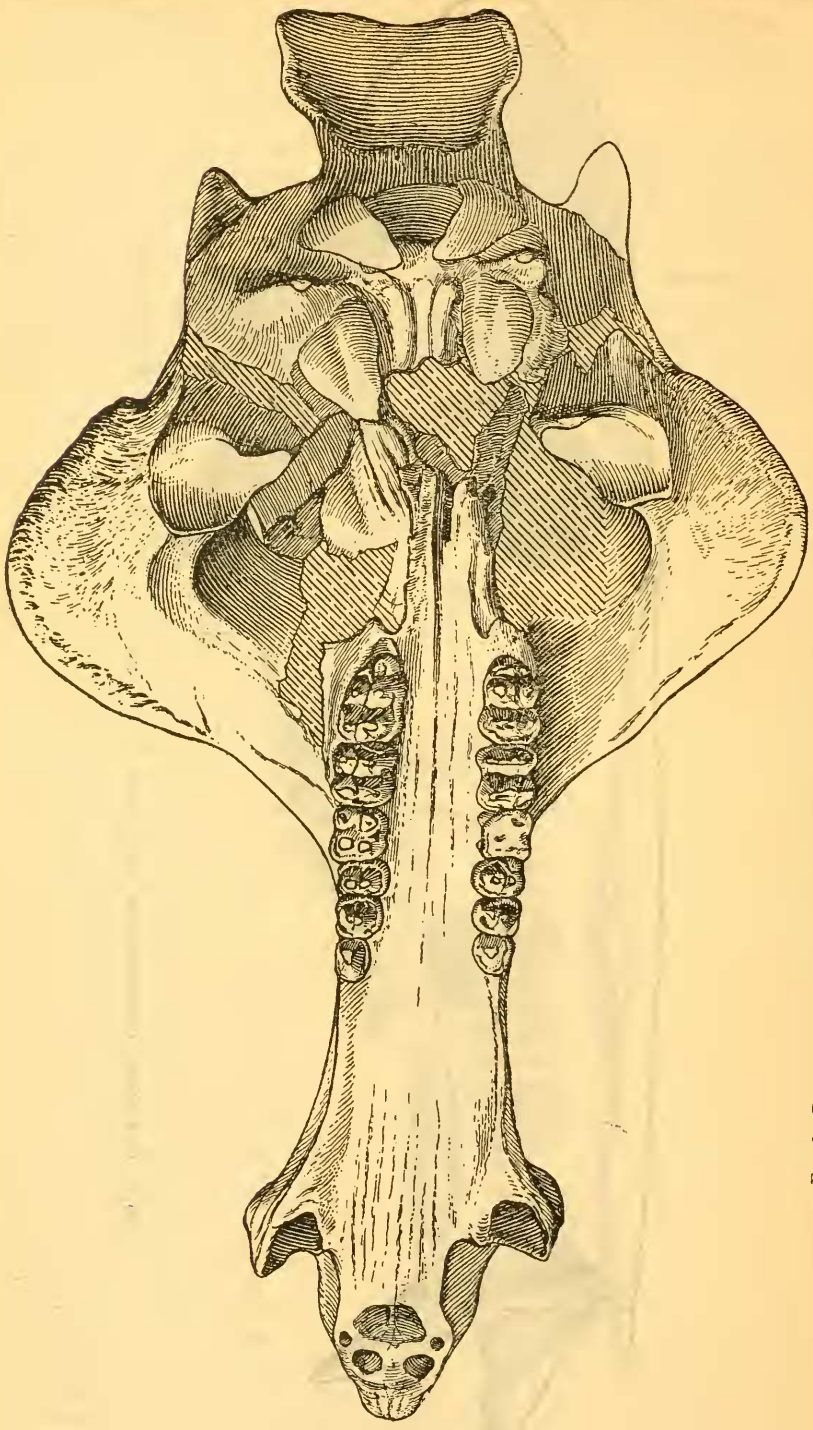

FIG. 2.—PLATYGONUS CUMBERLANDENSIS. SKULL, PALATE VIEW, × ½. TYPE SPECIMEN, CAT. NO. 8146, U.S.N.M.

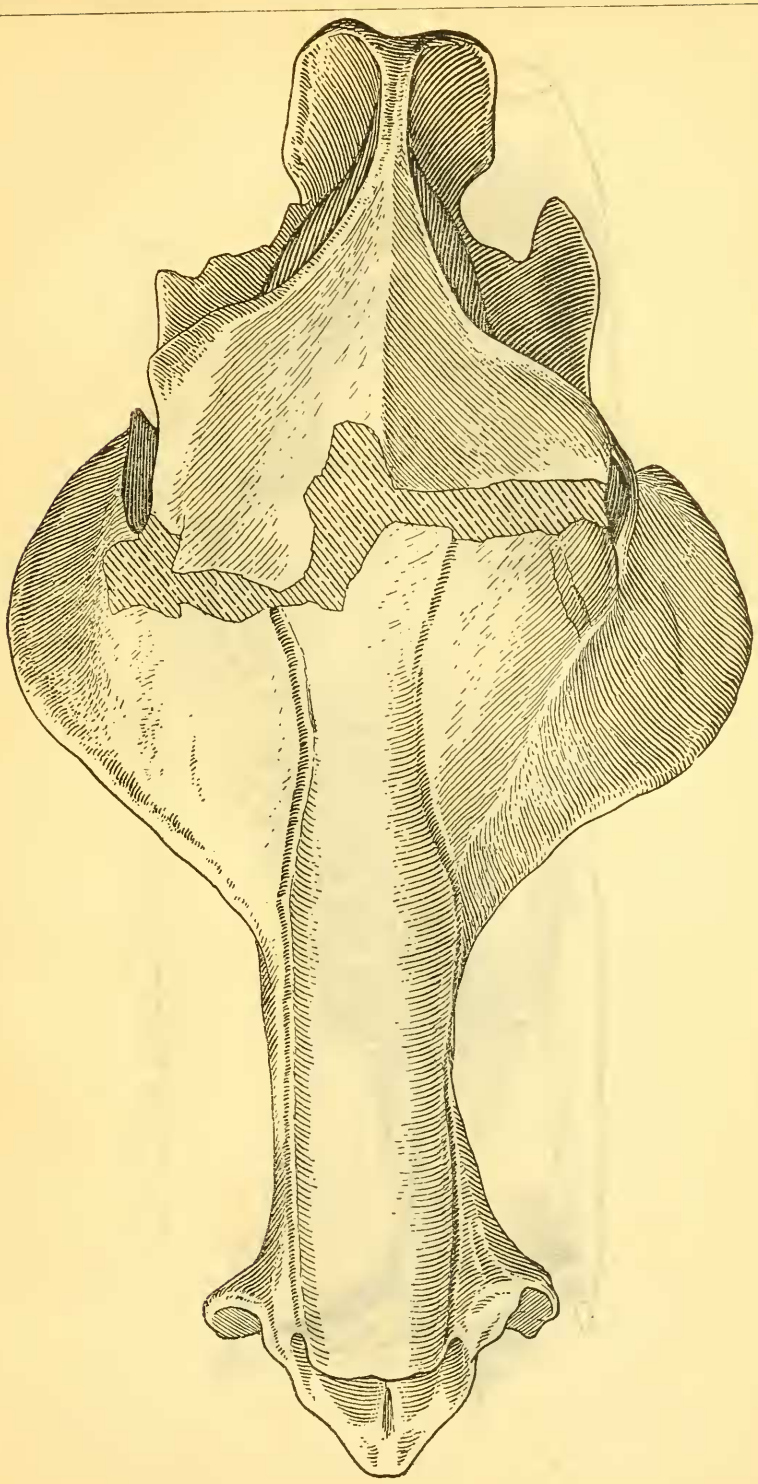

FIG. 3.—PLATYGONUS CUMBERLANDENSIS. SKULL, TOP VIEW. × ½. TYPE SPECIMEN, CAT. NO. 8146, U.S.N.M.

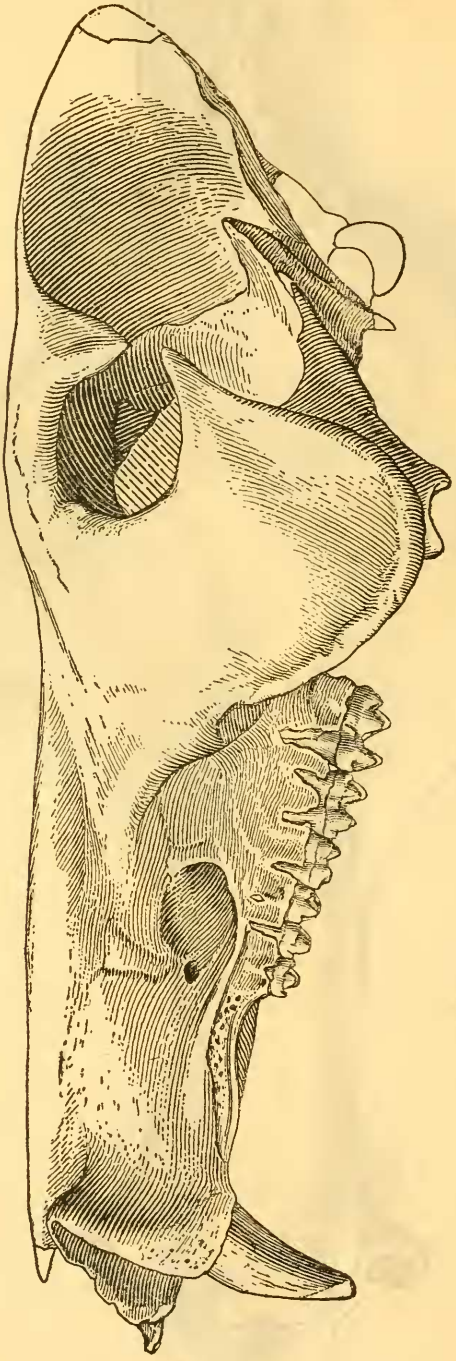

FIG. 4.—PLATYGONUS INTERMEDIUS. MALE SKULL, VIEW OF LEFT SIDE. × ½. TYPE SPECIMEN, CAT. NO. 8148, U.S.N.M.

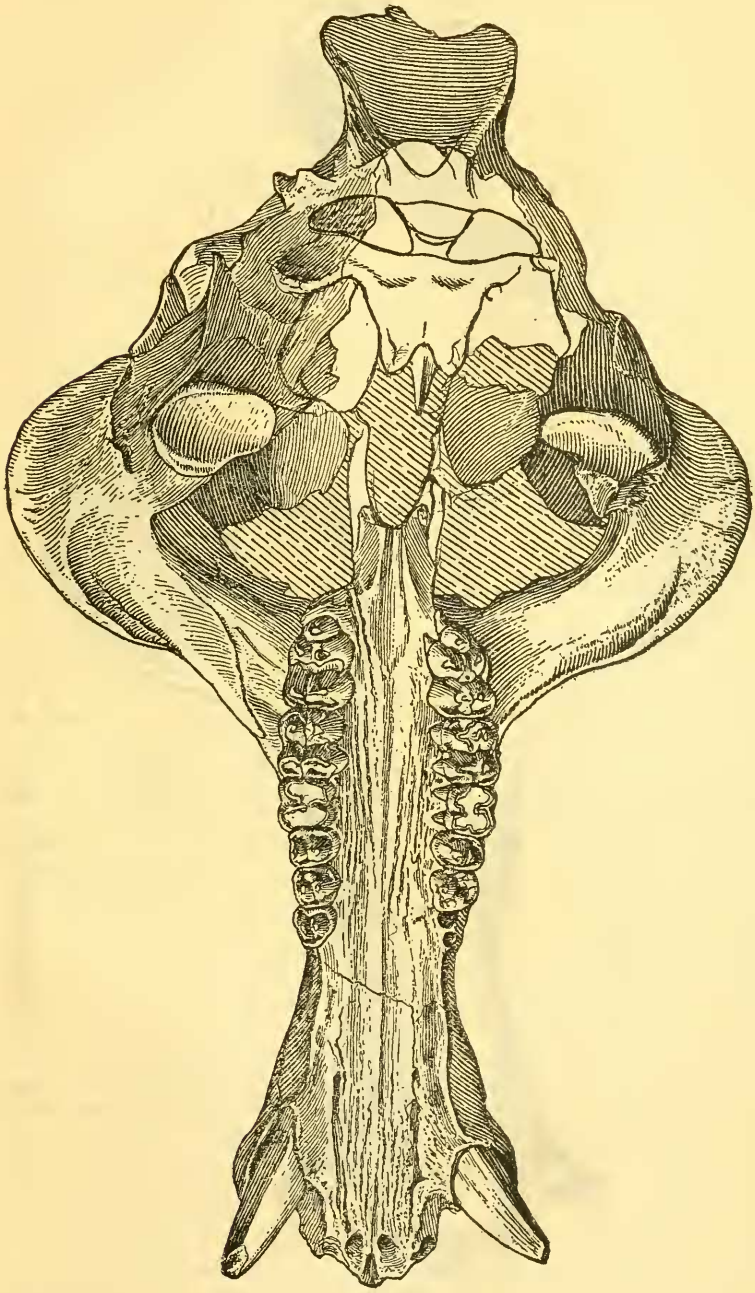

FIG. 5.—PLATYGONUS INTERMEDIUS. MALE SKULL, PALATE VIEW. × ½. TYPE SPECIMEN, CAT. NO. 8148, U.S.N.M.

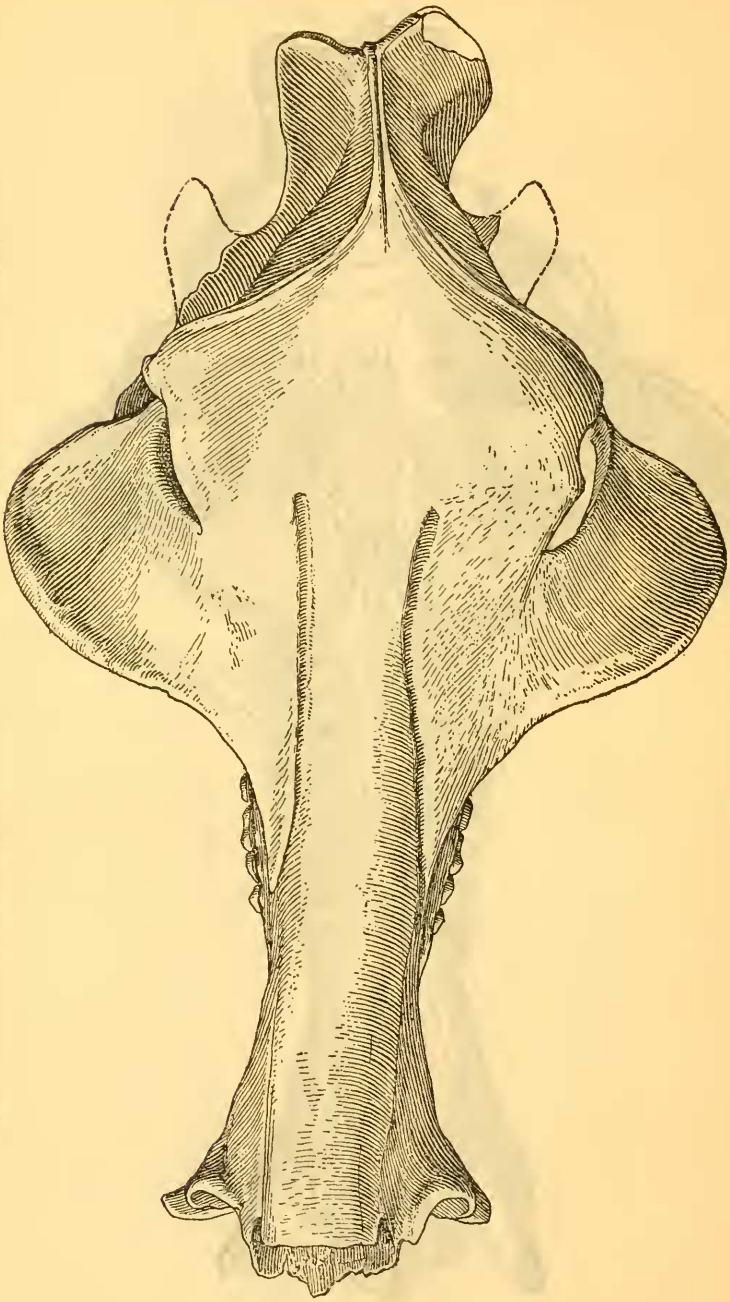

FIG. 6.—PLATYGONUS INTERMEDIUS MEDIUS. TYPE SKULL, VIEW FROM ABOVE. × ½. CAT. NO. 8178, U.S.N.M.

Hind limbs and feet:	
Greatest length of innominate bone	270
Center of acetabulum to anterior border of ilium	140
Center of acetabulum to posterior end of ischium	135
Diameter of acetabulum	35
Length of pubic symphysis	90
Longest diameter of obturator foramen	52
Greatest length of femur	225
Anteroposterior diameter of head of femur	34
Transverse diameter of head of femur	30
Transverse diameter of condyles of femur	53
Transverse diameter of trochlea of femur	25
Length of tibia, inner side	205
Width of proximal end of tibia	54
Width of distal end of tibia	35
Width of astragalus, proximal end	26
Greatest length of astragalus	42
Greatest length of calcaneum	75
Total length of tarsus	62
Width of metatarsals, proximal end	30
Width of metatarsals, distal end	34
Length of tarsals, inner side	97
Least width of fused metatarsals	23
Total length of three phalanges of digit III	86
Ribs:	
Length of first rib	130
Length of fifth rib	260
Length of tenth rib	260
Length of last rib	175

Measurements in millimeters of skull No. 8003, from Renick, West Virginia.

Length of cheek-tooth series		90
Length of premolar series		36
	Anteroposterior.	Transverse.
Diameters of i^1	10	8
canine	15.3	10
p^2 (broken out).		
p^3	12	11
p^4	11.2	13.8
m^1	13.5	14.5
m^2	17.5	16.5
m^3	23	18
Length of diastema behind canine		71
Length of diastema behind c and i^1 (i^2 wanting		34
Distance across first pair of molars		60
Width of palate between second molars		26
Width of palate between second premolars		28.5
Width of palate just anterior to cheek-tooth rows		34
Width between canines		46
Basal length of skull, measured from condylar notch		350
Extreme length of skull, including inion		410
Posterior border of orbit to posterior border of inion		112
Diameter of orbit		38

Anterior border of orbit to end of premaxillary	265
Depth of skull at condyles	140
Depth of skull at glenoid fossae	138
Greatest width of zygomatic expansion below the orbit	62
Width of skull across zygomatic expansion	180
Width of face at middle of orbits	120
Width of face at postorbital processes	132
Width of face above infraorbital foramina	47

Measurements in millimeters of Platygonus skulls from Cumberland Cave Deposit.

	P. cumberlandensis.		*P. intermedius.*	
	Type (male) No. 8146.	Paratype (female) No. 8200.	Paratype (female) No. 8153.	Type (male) No. 8148.
Total length of dental series, upper	214.0	209.0	198.0	208.0
Length of cheek-tooth series, upper	94.5	86.5	90.5	95.5
Length of premolar series, upper	35.2	34.0	35.0	35.6
Total length of dental series, lower	208.0	201.0	.....	200.0
Length of cheek-tooth series, lower	96.0	90.0	.....	98.0
Length of premolar series, lower	35.2	34.0	.....	36.0
DIAMETERS OF UPPER TEETH.				
i^1, lengthwise of the alveolar border	Out.	11.0	Out.	Out.
i^2, lengthwise of the alveolar border	Out.	8.0	Out.	Out.
Canine, lengthwise of the alveolar border	20.0?	15.0	17.0?	22.5
p^2, lengthwise of the alveolar border	11.7	11.0	11.7	12.0
p^3, lengthwise of the alveolar border	11.7	11.0	11.8	12.0
p^4, lengthwise of the alveolar border	11.7	11.6	11.0	11.0
m^1, lengthwise of the alveolar border[1]	15.2	12.5	15.0	15.0
m^2, lengthwise of the alveolar border	19.6	18.0	18.0	19.6
m^3, lengthwise of the alveolar border	24.5	20.6	22.0	26.0
l^1, transverse of alveolar border	8.7	.....	Out.	Out.
i^2, transverse of the alveolar border	.....	6.3	Out.	Out.
c, transverse of the alveolar border	12.0	10.4	10.5?	13.0
p^2, transverse of the a.veolar border	11.3	10.5	11.0	11.2
p^3, transverse of the alveolar border	13.5	13.3	13.0	14.0
p^4, transverse of the alveolar border	14.3	14.0	13.5	14.5
m^1, transverse of the alveolar border[1]	15.0	16.0	15.0	15.0
m^2, transverse of the alveolar border	18.0	16.0	17.0	18.2
m^3, transverse of the alveolar border	18.2	17.0	18.3	19.4

[1] This tooth in the first two specimens is much worn, the enamel being almost entirely wanting.

DIAMETERS OF LOWER TEETH.

	Type (male) No. 8146.	Paratype (female) No. 8200.	Paratype (female) No. 8153.	Type (male) No. 8147.
i_1, lengthwise of alveolar border	.....	6.0	.....	7.0
i_2, lengthwise of alveolar border	.....	6.4	.....	5.0
c, lengthwise of alveolar border	16.5	13.0	.....	14.4
p_2, lengthwise of alveolar border	9.5?	10.0	.....	10.0
p_3, lengthwise of alveolar border	12.8	11.6	.....	12.1
p_4, lengthwise of alveolar border	12.8	11.6	.....	12.1
m_1,[1] lengthwise of alveolar border	14.0?	12.6	.....	15.4
m_2, lengthwise of alveolar border	20.0	18.0	.....	19.0
m_3, lengthwise of alveolar border	25.5	22.8	.....	25.7
i_1, transverse of alveolar border	Out.	7.2	.....	7.0
i_2, transverse of alveolar border	Out.	6.0	.....	6.0
c, transverse of alveolar border	13.4	10.5	.....	10.0
p_2, transverse of alveolar border	8.0	7.5	.....	7.5
p_3, transverse of alveolar border	10.0	9.0	.....	11.3
p_4, transverse of alveolar border	11.7	11.5	.....	12.5
m_1, transverse of alveolar border	13.0	11.8	.....	11.5
m_2, transverse of alveolar border	15.5	14.0	.....	15.0
m_3, transverse of alveolar border	16.0	15.0	.....	15.8

LOWER JAW MEASUREMENTS.

	Type (male) No. 8146.	Paratype (female) No. 8209.	Paratype (female) No. 8153.	Type (male) No. 8148.
Length of diastema behind canine (straight line)	76.0?	75.0	.....	63.0
Length of diastema between c and i^2	4.0	9.0	.....	5.5
Length of symphysis in front (in straight line)	100.0	100.0	.....	88.5
Depth of symphysis in median line	31.0	30.0	.....	35.0?
Depth of symphysis at mental foramen	48.0	45.0	.....	.....
Depth of lower jaw at m^1	Broken.	52.0	.....	49.0
Depth of lower jaw at condyle	Broken.	90.0	.....	92.0
Depth of lower jaw at coronoid process	Broken.	115.0	.....	107.0
Width between alveoli of lower canines	20.0	22.0	.....	20.0
Total length of lower jaw, condyle, to tip of incisors	Broken.	268.0	.....	280.0

SKULL MEASUREMENTS.

Length of diastema behind canine	65.0	71.0	56.0	60.0
Length of diastema between c and i^2	26.0	26.0	25.0	21.5
Distance across 1st pair of molars	61.0	59.0	57.0	60.5
Width of palate between second molars	22.0	23.5	20.5	21.0
Width of palate between second premolars	29.0	21.0	23.0	28.0
Width of palate just anterior to p^2	45.0	36.0	35.0	36.0
Width of palate between canines	50.0	50.0	43.0	45.0
Total basal length measured from condylar notch	360.0	320.0	317.0	325.0?
Extreme length of skull	420.0	382.0	360.0	380.0?
Post-border of orbit to post-border of inion	125.0	92.0	90.0	115.0
Anteroposterior diameter of orbit (nearly circular)	40.0?	38.0	38.0	40.0
Anterior border of orbit to extreme end of premaxillary	270.0	250.0	230.0	235.0?
Depth of skull at condyles	140.0	135.0	132.0	Broken.
Depth of skull at glenoid fossa	130.0?	125.0	120.0?	120.0?
Greatest breadth of zygomatic expansion below orbit	84.0	55.0	46.5	78.0
Greatest width of skull across zygomas	230.0	168.0?	164.0	206.0
Width of face at middle of orbits	135.0	114.0	106.0	120.0
Width of face at postorbital processes	140.0	125.0	116.0	132.0
Width of face above infraorbital foramen	51.0	Crushed.	45.0?	45.0?

In the above table, question marks indicate the exact measurements could not be taken but could be stimated within a reasonable degree of accuracy.

There seems to be exhibited a rather wide degree of variations in certain skull and dental characters in this material from the Cumberland cave, which suggests there are still other species represented. But I have been unable to find any consistent group of well marked differences which at present appear to warrant the recognition of more species than I have here described. In fact, in view of the great degree of variability, which variability my present knowledge of these forms seems not sufficient to properly interpret, it is with some hesitancy that I propose a distinct species even for the specimens just described as *P. intermedius*. However, it appears hardly probable that such a very considerable difference in relative proportions of dentition and skull could exist within a single species. It is possible also that, as I have already intimated, I have allowed too much for "individual variation" in the material I am assigning temporarily to *P. cumberlandensis*. For example, in comparing the skulls of this collection I find a wide variation in zygomatic development (pls. 54, 55). Another species is possibly indicated by a skull (No. 8003, U.S.N.M.) from a cave deposit unearthed in developing a quarry on the west bank of the Green Brier, near Renick, West Virginia (figs. 7–9). This skull, which is evidently that of a female, was discovered, strangely enough, about the same time as the Cum-

FIG. 7.—PLATYGONUS CF. CUMBERLANDENSIS. GIDLEY. FEMALE SKULL, VIEW OF LEFT SIDE. × ½. SPECIMEN FROM RENICK, WEST VIRGINIA. CAT. NO. 8003, U.S.N.M.

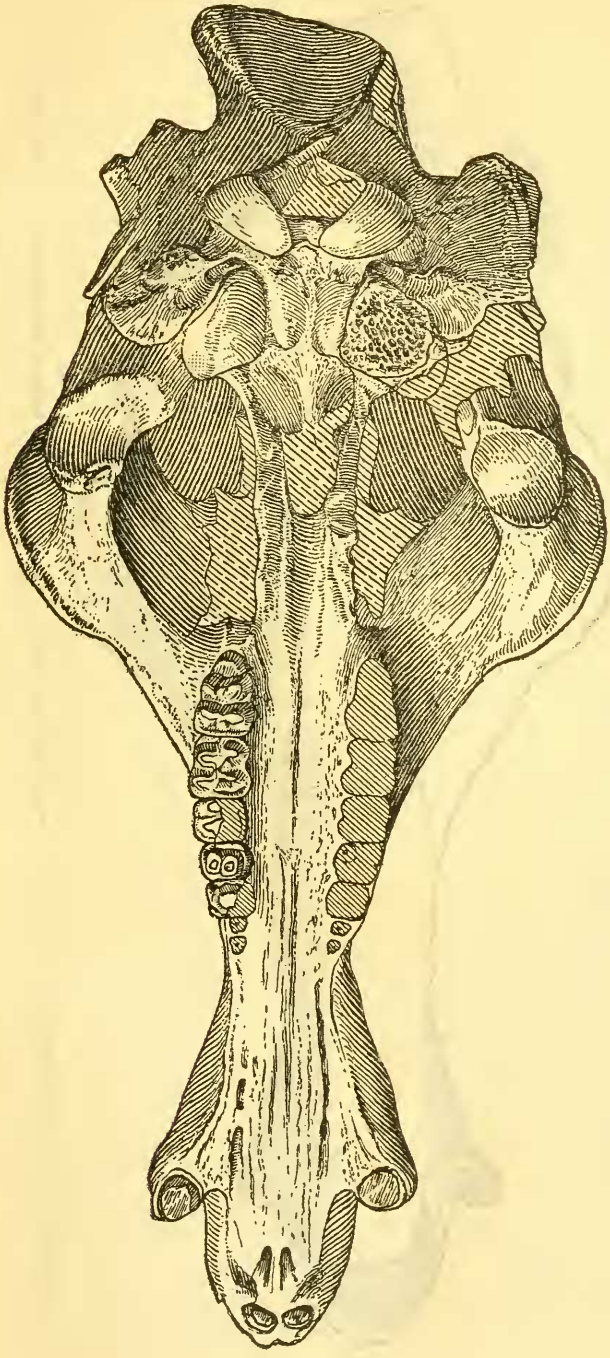

FIG. 8.—PLATYGONUS CF. CUMBERLANDENSIS. GIDLEY. FEMALE SKULL, PALATE VIEW. × ½. SPECIMEN FROM RENICK, WEST VIRGINIA. CAT. NO. 8003, U.S.N.M.

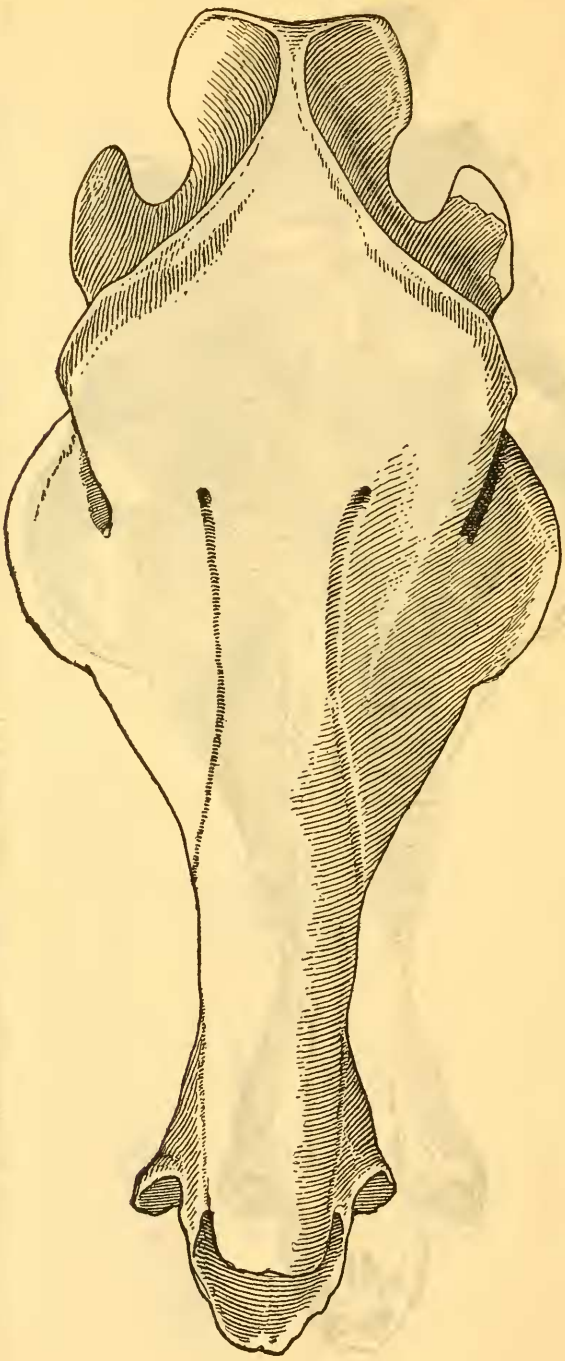

FIG. 9.—PLATYGONUS CF. CUMBERLANDENSIS. GIDLEY. FEMALE SKULL, VIEW FROM ABOVE. × ½. SPECIMEN FROM RENICK, WEST VIRGINIA. CAT. NO. 8003, U.S.N.M.

berland Cave deposit. It is larger than any of the female skulls from the latter locality, but the teeth have about the same dimensions, and much the general appearance of those of specimens I have referred to *P. intermedius*. It differs from both Cumberland Cave species in the reduction of the upper incisors to a single pair. This character, however, should not be relied upon too strongly, since the second pair of incisors is much reduced in all species of this genus. Their occasional absence might mean no more than an individual variation. Still another form seems to be represented by a skull (No. 8151 U.S.N.M. Coll.) in which the characters of the teeth differed more than might be expected between individuals of the same species. In this specimen the canines are relatively long, slender, sharply pointed, and their sides, or plains, are evenly convex, showing none of the longitudinal grooving usually observed. The cheek-teeth have the main cusps relatively higher, more evenly cone-shaped in outline, and the apices of the transverse pairs of cusps, especially in the premolars, more nearly approach each other than is usual in species of *Platygonus*. The specimen, which is that of a young adult female, is too badly crushed to make out some of the more important skull characters. There seems to be little variation in foot structure in species of this genus. (See fig. 10.)

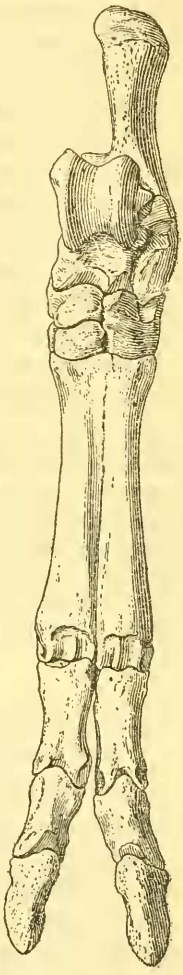

FIG. 10.—PLATYGONUS CUMBERLANDENSIS. LEFT HIND FOOT. × ½. SPECIMEN FROM CUMBERLAND CAVE. CAT. NO. 7690, U.S.N.M.

Genus MYLOHYUS Cope.

Type.—Dicotyles nasutus Leidy.

(For definition of genus see p. 656.)

Three seemingly valid species of the genus have been described, all so far as known being confined to the Pleistocene. In every case the type specimens and subsequently collected material are fragmentary, yet they consist of sufficiently characteristic parts to admit of a reasonably clear definition for the genus as given above. The material collected and described by Brown from the Conard Fissure is especially enlightening and from it we have our first definite knowledge of the foot modifications of this group. The material from the Cumberland Cave here described, likewise fragmentary, not only contributes something in working out clearer definitions for the species hitherto proposed, but adds a new species to the genus.

MYLOHYUS NASUTUS (Leidy).

Dicotyles nasutus LEIDY Proc. Acad. Nat. Sci., Philadelphia, 1868, p. 230.

Type.—Anterior portion of a palate containing the canine and anterior two premolars of the right side, one incisor of the left side, and the alveolii for the other incisors and the left canine.

Locality.—Gibson County, Indiana, discovered in digging a well, at a depth of between 30 and 40 feet.

Diagnosis.—Canines with strongly marked longitudinal ribs, or striations; upper premolars, p^2 and p^3 (other cheek-teeth not known), with anteroposterior diameter (according to Leidy's measurements) as great or greater than the transverse diameter; parastyle, metaconule, and hypostyle appearing as well-defined cuspules; and "a conspicuous outwardly projecting ridge" above the alveolar border of the upper premolars and in advance of the infraorbital canal.

Measurements.—Taken from Leidy's table of measurements, given in lines and here translated into millimeters:[1]

Length of diastema behind canine	62.5
Anteroposterior diameter of p^2	9.2
Transverse diameter p^2	8.2
Anteroposterior diameter p^3	11.4
Transverse diameter p^3	11.4
Anteroposterior diameter of c	11.8
Transverse diameter of c	7.1
Width of palate between the third premolars (estimated from Leidy's figure)	24.0

MYLOHYUS PENNSYLVANICUS (Leidy).

Dicotyles pennsylvanicus LEIDY, Ann. Rept. Geol. Surv., Pennsylvania, for 1887, published in 1889, pp. 8–12, pl. 2, figs. 3–6.

Type.—Portions of the upper and lower jaws each carrying the milk dentition and the first true molar of each side.

Locality.—"Hartman's," or "Crystal Hill" cave, about 3 miles west of Stroudsburg and 5 miles from the Delaware Water Gap.

Diagnosis.—A larger species than *M. nasutus*, with apparently a relatively shorter diastema between the canine and the cheek-tooth series, and (according to Leidy) with the absence of the "conspicuous outwardly projecting ridge" on the alveolar border above the premolars observed in *M. nasutus*.

I refer to the species a fragment of a right lower jaw containing the last two molars (Cat. No. 8162, U.S.N.M. Coll.). These teeth are relatively much narrower than the corresponding ones of *M. exortivus* described on page 676. The measurements are for m_2, anteroposterior diameter 17.2 mm., transverse diameter 13.7 mm.; for m_3, anteroposterior diameter 22.3 mm., transverse diameter 13.5 mm.

[1] Journ. Acad. Sci., Philadelphia, ser. 2, vol. 7, 1869, p. 387.

Measurements of M. pennsylvanicus. Type —. (From Leidy's report)—	mm.
Length of symphysis in front	70
Depth of jaw before first molar	30
Thickness of jaw below first molar	30
Width of jaw below first molar	57
Width of symphysis at narrowest point	20

MYLOHYUS TETRAGONUS Cope.

Mylohyus tetragonus Cope, Journ. Acad. Nat. Sci., Philadelphia, ser. 2, vol. 9, 1899, p. 260.

Type.—"An imperfect left mandibular ramus with the corresponding part of the symphyseal region," containing the canine, three milk-molars, and two true molars.

Locality.—Port Kennedy bone deposit, Upper Merion Township, Montgomery County, Pennsylvania.

Diagnosis.—The chief distinguishing feature of this species as described by Cope is the form of the canine, which has the internal posterior angle truncated, giving a tetragonal cross section to this tooth. But this character is so unusual for any suilline I am inclined to consider it pathological. The species, however, seems to differ from *M. pennsylvanicus* (with which it agrees only in size), and likewise from all other described species, in the relatively shorter space or diastema between the canine and the cheek-teeth, indicating a comparatively short-nosed species.

Measurements (after Cope)—	mm.
Length of diastema	63
Anteroposterior diameter of c	10
Transverse diameter of c	6
Length of cheek-tooth series from dp_2 to m_2	77
Anteroposterior diameter of p_3 (=pm_2 of Cope)	14
Transverse diameter of p_3	10
Anteroposterior diameter of p_4 (=pm_1 of Cope)	15
Transverse diameter of p_4	13
Anteroposterior diameter of m_1	16
Transverse diameter of m_1	13
Antroposterior diameter of m_2	18
Transverse diameter of m_2	14.5

MYLOHYUS BROWNI, new species.

Mylohyus sp. a, Brown, Mem. Amer. Mus. Nat. Hist., vol. 9, pt. 4, 1908, p. 201, pl. 24.

Type.—A left lower jaw with symphyseal portion of both sides attached (Cat. No. 11810, Amer. Mus. Nat. Hist. Coll.).

Type locality.—Fifteen miles south of Harrison, near the northern line of Newton County, Arkansas.

Diagnosis.—According to Brown, "agrees in dental characters with *M. tetragonus* with the exception of the canine. This tooth has only three planes, as in *Tayassu*, whereas in *M. tetragonus* it is

described as having four planes in an unworn condition. The measurements, however, differ considerably. The jaw is very long and slender and displays a diastema nearly equal in length to the molar [=molar-premolar] series. The canine is rather small and is separated from the incisors by a diastema of fourteen millimeters. The second pair of incisors is nearly horizontal. Ventrally the symphysis is evenly convex and is contracted to a round heel."

Measurements (after Brown)—	*mm.*
Length of diastema	89
Length of molar series (=cheek-tooth series)	91
Depth of symphysis	18
Width of jaws at narrowest constriction	21

Brown's definition of this form seems sufficiently diagnostic to distinguish it from all other species of the genus. Its comparatively superior length of symphyseal and incisive portions, which indicates an extremely long-nosed form, alone make it readily recognizable. I therefore have proposed for this type the name *Mylohyus browni.*

The second specimen, designated as "*Mylohyus* sp. b." (No. 11814), I regard, as suggested by Brown, probably the male phase of the species just described. The third symphysal portion, designated by Brown as "*Mylohyus* sp. c," however, has all the characteristics of the *Platygonus* group and I believe should be referred to that genus.

MYLOHYUS EXORTIVUS, new species.

Type.—Lower jaw, nearly complete, containing the entire dentition of both sides; and five upper cheek-teeth, p^3 to m^3, of the right side (Cat. No. 8876, U.S.N.M. Coll.).

Locality.—Cumberland Cave deposit, 4 miles northwest of Cumberland, Maryland.

Diagnosis.—About the size of or perhaps somewhat smaller than *M. nasutus* (Leidy), and apparently differing from that species in (1) the modifications of the canines, which seem to be relatively wider in cross-section and almost entirely lacking the longitudinal ribbing so characteristic of these teeth in *M. nasutus;* (2) the form of the third upper premolar (the only tooth which can at present be directly compared) which is proportionately broader, while the secondary cuspules are much less prominent; and (3) the relative distance between the cheek-tooth rows of the opposite sides, which is much greater than in the type of Leidy's species.

A second specimen (Cat. No. 8160 U.S.N.M. Coll.), consisting of three milk molars and the first true molar of the right side (see fig. 13), seems to belong to this species, although the first molar, which is entirely unworn, is much narrower than the corresponding tooth in the fully adult type specimen. This difference, however,

may be due to the fact that in the young specimen this tooth had not reached the stage where the roots had begun to form and is therefore so immature as not to have yet acquired its maximum width.

This specimen is especially interesting, since it affords a comparison of the milk dentition with that of the type of *M. pennsylvanicus*. The unworn condition of the deciduous teeth and the incomplete development of the first permanent molar in this species indicate a somewhat younger individual than Leidy's type. It differs from the latter in (1) the smaller size of the corresponding teeth (see table of measurements), (2) in the narrower proportions of the milk-molars, and (3) in the greater complication of secondary cus-

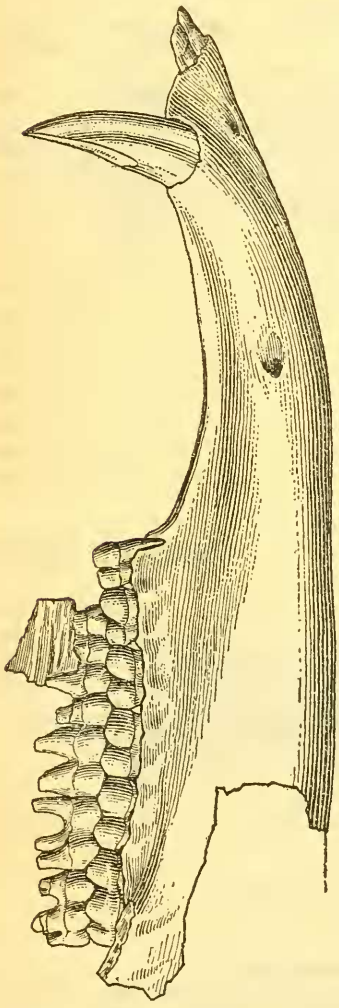

FIG. 11.—MYLOHYUS EXORTIVUS. ANTERIOR PORTION OF LOWER JAW AND CHEEK TEETH, VIEW OF RIGHT SIDE. TYPE SPECIMEN, CAT. NO. 8876, U.S.N.M.

FIG. 13.—MYLOHYUS EXORTIVUS. UPPER DECIDUOUS MOLARS AND FIRST TRUE MOLAR OF RIGHT SIDE, ×1. SPECIMEN FROM CUMBERLAND CAVE. CAT. NO. 8160, U.S.N.M.

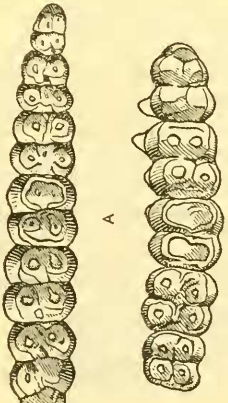

FIG. 12.—MYLOHYUS EXORTIVUS. A, LOWER CHEEK TEETH. B, UPPER CHEEK TEETH; BOTH OF RIGHT SIDE. × ⅓. TYPE SPECIMEN, CAT. NO. 8876, U.S.N.M.

pules, especially in the anterior half of each of these teeth. In this last feature they show a decided advance in complexity of the milk-teeth over those of either of the living genera of peccaries. This is less pronounced in *M. pennsylvanicus* but this species also has more complex milk-molars than either *Tayassu* or *Pecari*.

Measurements of type in millimeters.

Lower teeth and jaws.

	Anteroposterior diameter.	Transverse diameter.
Canine	12.7	9.0
P_2	10.	6.4
P_3	11.	10.2
P_4	12.5	13.
M_1	13.7	13.4
M_2	15.	14.
M_3	19.7	13.3
Length of diastema behind canines		71.
Length of diastema in front of canines		11.2
Vertical depth of symphysis, median line		19.5
Width of symphysis at narrowest point		24.
Depth of jaw below first molar		70.
Thickness of jaw below first molar		20.
Width across both jaws below first molar		70.
Width of jaws at canines		35.
Width between canine alveoli		15.

Upper cheek teeth.

	Anteroposterior diameter.	Transverse diameter.
P^3	10.3	11.8
P^4	12.3	13.8
M^1	14.	14.5
M^2	15.	15.
M^3	16.	13.

Measurements of upper milk teeth (specimen No. 8106).

Dp^2	10.	7.5
Dp^3	12.5	9.
Dp^4	12.	11.5
M^1	14.	11.5

EXPLANATION OF PLATES.

PLATE 54.

(About one-fourth natural size.)

UPPER—*Platygonus* cf. *cumberlandensis*. Top view of skull No. 7992, U.S.N.M.

LOWER—*Platygonus cumberlandensis*. Top view of skull No. 8000, U.S.N.M.

(Showing supposed extremes of variation.)

PLATE 55.

(About one-fourth natural size.)

UPPER—*Platygonus* cf. *cumberlandensis*. Palate view of skull No. 7992, U.S.N.M.

LOWER—*Platygonus cumberlandensis*. Palate view of skull No. 8000, U.S.N.M.

(Showing supposed extremes of variation.)